

REMARKS

In the Office Action, the Examiner rejected claims 1-20 under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 6,353,918, issued to Carothers, et al. (“Carothers”). In this Amendment, Applicants have amended the specification. Applicants have amended claim 1-14, 18, and 19. Applicants have canceled claim 20. Applicants do not surrender any equivalents of any amended claims or limitations. Applicants have added claim 21. Accordingly, claims 1-19 and 21 will be pending after the entry of this Amendment.

I. Amendments to the Specification

Applicants have amended the specification for clarity. The amendments are to fix typographical and grammatical errors. All changes are fully supported by the specification and the drawings. Therefore, Applicants respectfully submit that the amended specification does not include any new subject matter.

II. Rejection of Claims 1-8 under 35 U.S.C. § 102(e)

In the Office Action, the Examiner rejected claims 1-8 under 35 U.S.C. § 102(e) as being anticipated by Carothers. Claims 2-8 are directly or indirectly dependent on claim 1.

Claim 1 recites a method of pre-computing routes for nets for a router. The router uses a set of partitioning lines to partition a region of a design layout into several sub-regions, where a sub-region configuration is a set of sub-regions, and different sub-region configurations represent different sets of sub-regions. The method identifies groups of related sub-region configurations. Each group has different first and second sub-region

configurations. For each group, the method identifies and stores a base set of routes for the first configuration in the group. Each route in the base set connects the sub-regions of the first configuration. The method stores a set of indicia specifying how to generate a related set of routes for the second configuration from the base set of routes.

Applicants respectfully submit that Carothers does not disclose, teach, or even suggest all of the limitations of claim 1 for several reasons. *First*, Carothers does not disclose, teach, or even suggest a method that uses a set of partitioning lines to partition a region of a design layout into several sub-regions. The only partitioning mentioned in Carothers is merely “partitioning an overall electrical system into a series of circuits.” *See* Carothers, col. 4, lines 46-49; *see also* Fig. 2. Carothers makes no mention of using partitioning lines to partition a region of a design layout into several sub-regions. Therefore, Applicants respectfully submit that Carothers does not disclose, teach, or even suggest using a set of partitioning lines to partition a region of a design layout into several sub-regions.

Second, Applicants respectfully submit that Carothers does not disclose, teach, or even suggest identifying groups of *related* sub-region configurations, where a sub-region configuration is a set of sub-regions. Applicants respectfully submit that there is no such discussion in Carothers of identifying groups of related sub-region configurations, and nothing in Carothers discloses, teaches, or even suggests such a limitation.

Third, Applicants respectfully submit that Carothers does not disclose, teach, or even suggest storing a set of indicia for each configuration in each group specifying how to generate a related set of routes for each configuration from a base set of routes stored

for the group. In the Office Action, the Examiner stated that such a limitation is disclosed by Carothers at column 9, line 30-column 10, line 67. *See* Office Action, p. 2, lines 17-20. This portion of Carothers discusses choosing routes with no geometrical or electrical restraints from among candidate routes. *See* Carothers, column 9, lines 30-35. This portion also discusses reducing edges from a compatibility graph and selecting one route out of potential route candidates. *See* Carothers, col. 10, lines 26-27, 53-55.

There is no discussion of storing a set of indicia on how to generate a related set of routes for each configuration, only a discussion of choosing one route out of several pre-computed routes. Therefore, Applicants respectfully submit that Carothers does not disclose, teach, or even suggest storing a set of indicia for each configuration in each group specifying how to generate a related set of routes for each configuration from a base set of routes.

In view of the foregoing, Applicants respectfully submit that claim 1 is valid over Carothers and is in condition for allowance. As claims 2-8 are directly or indirectly dependent on claim 1, Applicants respectfully submit that claims 2-8 are valid over Carothers for at least the reasons that were discussed above for claim 1. In view of the foregoing, Applicants respectfully request reconsideration and withdrawal of the § 102(e) rejection of claims 1-8.

III. Rejection of Claims 9-17 under 35 U.S.C. § 102(e)

In the Office Action, the Examiner rejected claims 9-17 under 35 U.S.C. § 102(e) as being anticipated by Carothers. Claims 10-17 are directly or indirectly dependent on claim 9.

Claim 9 recites a method of pre-computing routes for an electronic design automation (“EDA”) router that routes nets within a region of an integrated-circuit layout. The method defines a set of partitioning lines for partitioning the region into several sub-regions, where different sets of sub-regions represent different sub-region configurations. For a first sub-region configuration, the method identifies a first set of routes, where each route in the first set connects the first set of sub-regions. The method identifies a second sub-region configuration that is symmetrical to the first sub-region configuration. The method also stores the first set of routes in a storage structure. The method further stores a set of indicia specifying how to generate a second set of routes for the second sub-region configuration from the first set of routes stored for the first sub-region configuration.

Applicants respectfully submit that Carothers does not disclose, teach, or suggest all of the limitations of claim 9 for at least the following reasons. *First*, Carothers does not disclose, teach, or even suggest defining a set of partitioning lines for partitioning a region into several sub-regions. In the Office Action, the Examiner stated that Carothers teaches such a limitation at column 7, lines 45-56. *See* Office Action, lines 21-23. This portion of Carothers discusses “[d]efining routes within [a] bounding box for a pair of nodes.” *See* Carothers, col. 7, lines 45-46. There is no discussion in Carothers of *defining* a set of partitioning lines. Carothers suggests that a bounding box is merely an inherent property of a net; i.e., it is “the rectangle formed by the source and target nodes.” *See* Carothers, col. 7, lines 39-40. Further, no discussion in Carothers suggests that different bounding boxes represent different sub-region configurations. Therefore, Applicants

respectfully submit that incidentally resulting bounding boxes should not be analogized to a defined set of partitioning lines.

Second, Applicants respectfully submit that Carothers does not disclose, teach, or even suggest identifying a second sub-region configuration that is symmetrical to a first sub-region configuration. In the Office Action, the Examiner stated that Carothers teaches such a limitation at column 8, line 26-column 9, line 28 by teaching sets of type one and type two routes being plotted. *See* Office Action, p. 3, lines 1-2. Type one candidate routes have one via, and type two candidate routes have two vias. *See* Carothers, col. 8, lines 29-30, 56-57. This portion does not discuss a second sub-configuration that is symmetrical to a first sub-configuration. In fact, Carothers does not discuss or suggest the concept of symmetry at all. Accordingly, Applicants respectfully submit that merely routing multiple candidate routes does not disclose, teach, or even suggest identifying a second sub-region configuration that is symmetrical to a first sub-region configuration.

Third, Applicants respectfully submit that Carothers does not disclose, teach, or even suggest storing a set of indicia specifying how to generate a second set of routes for a second configuration from a first set of routes stored for a first configuration. In the Office Action, the Examiner stated that such a limitation is disclosed by Carothers at column 9, line 30-column 10, line 67. *See* Office Action, p. 3, lines 3-5. This portion of Carothers discusses choosing routes without geometrical or electrical restraints from among candidate routes. *See* Carothers, column 9, lines 30-35. This portion also discusses reducing edges from a compatibility graph and selecting one route out of

potential route candidates. *See* Carothers, col. 10, lines 26-27, 53-55.

There is no discussion of storing a set of indicia on how to generate a set of routes based on another set of routes, only a discussion of choosing one route out of several pre-computed routes. Therefore, Applicants respectfully submit that Carothers does not disclose, teach, or even suggest storing a set of indicia specifying how to generate a second set of routes for a second configuration based on a first set of routes for a first configuration.

In view of the foregoing, Applicants respectfully submit that claim 9 is valid over Carothers and is in condition for allowance. As claims 10-17 are directly or indirectly dependent on claim 9, Applicants respectfully submit that claims 10-17 are valid over Carothers for at least the reasons that were discussed above for claim 9. In view of the foregoing, Applicants respectfully request reconsideration and withdrawal of the § 102(e) rejection of claims 9-17.

IV. Rejection of Claims 18 and 19 under 35 U.S.C. § 102(e)

In the Office Action, the Examiner rejected claims 18 and 19 under 35 U.S.C. § 102(e) as being anticipated by Carothers for the same reasons as claims 1-8 were rejected. Claim 19 is directly dependent on claim 18.

Claim 18 recites a computer medium having a computer program that pre-computes routes for nets. The computer program is for a router. The router uses a set of partitioning lines to partition a region of a design layout into several sub-regions, where a sub-region configuration is a set of sub-regions, and different sub-region configurations represent different sets of sub-regions. The computer program has a first set of

instructions for identifying groups of related sub-region configurations. Each group has different first and second sub-region configurations. The computer program has a second set of instructions for, for each group, identifying and storing a base set of routes for the first configuration in the group. Each route in the base set connects the sub-regions of the first configuration. The second set of instructions is also for, for each group, storing a set of indicia specifying how to generate a related set of routes for the second configuration from the base set of routes stored.

Applicants respectfully submit that Carothers does not disclose, teach, or even suggest all of the limitations of claim 18 for several reasons. *First*, Carothers does not disclose, teach, or even suggest using a set of partitioning lines to partition a region of a design layout into several sub-regions. The only partitioning mentioned in Carothers is merely “partitioning an overall electrical system into a series of circuits.” *See* Carothers, col. 4, lines 46-49; *see also* Fig. 2. Carothers makes no mention of using partitioning lines to partition a region of a design layout into several sub-regions. Therefore, Applicants respectfully submit that Carothers does not disclose, teach, or even suggest a router that uses a set of partitioning lines to partition a region of a design layout into several sub-regions.

Second, Applicants respectfully submit that Carothers does not disclose, teach, or even suggest identifying groups of *related* sub-region configurations, where a sub-region configuration is a set of sub-regions. Applicants respectfully submit that there is no such discussion in Carothers of identifying groups of related sub-region configurations, and nothing in Carothers discloses, teaches, or even suggests such a limitation.

Third, Applicants respectfully submit that Carothers does not disclose, teach, or even suggest storing a set of indicia for each configuration in each group specifying how to generate a related set of routes for each configuration from a base set of routes stored for the group. In the Office Action, the Examiner stated that such a limitation is disclosed by Carothers at column 9, line 30-column 10, line 67. *See* Office Action, p. 2, lines 17-20. This portion of Carothers discusses choosing routes with no geometrical or electrical restraints from among candidate routes. *See* Carothers, column 9, lines 30-35. This portion also discusses reducing edges from a compatibility graph and selecting one route out of potential route candidates. *See* Carothers, col. 10, lines 26-27, 53-55.

There is no discussion of storing a set of indicia on how to generate a related set of routes for each configuration, only a discussion of choosing one route out of several pre-computed routes. Therefore, Applicants respectfully submit that Carothers does not disclose, teach, or even suggest storing a set of indicia for each configuration in each group specifying how to generate a related set of routes for each configuration from a base set of routes.

In view of the foregoing, Applicants respectfully submit that claim 18 is valid over Carothers and is in condition for allowance. As claim 19 is directly dependent on claim 18, Applicants respectfully submit that claim 19 is valid over Carothers for at least the reasons that were discussed above for claim 18. In view of the foregoing, Applicants respectfully request reconsideration and withdrawal of the § 102(e) rejection of claims 18 and 19.

V. New Claim 21

In this Amendment, Applicants have added claim 21. Claim 21 is dependent on claim 1. Applicants respectfully submit that claim 21 is fully supported by the specification and is valid over the cited reference at least by virtue of its dependence on claim 1. Accordingly, Applicants respectfully submit that claim 21 is in condition for allowance.

CONCLUSION

In view of the foregoing, Applicants respectfully submit that all pending claims, namely claims 1-19 and 21, are in condition for allowance. Reconsideration of the rejections and objections is requested. Allowance is earnestly solicited at the earliest possible date.

Respectfully submitted,

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